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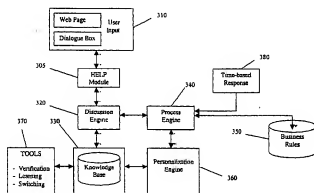
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(54) Title: CUSTOMER SUPPORT SYSTEMS AND METHODS PROVIDING INTEGRATED SELF DIRECTED, VIRTUAL AGENT AND LIVE AGENT INTERACTION BETWEEN CUSTOMERS AND ENTERPRISES OVER DATA NETWORKS

(57) Abstract: A system for providing integrated self directed and live agent interaction between enterprise users and an enterprise over data networks. An intelligent agent enabled help module having natural language capabilities and available for self directed help information to users over a data network. A live agent represented by enterprise call center resources, having access to said data network. An integration module for providing selective integration of a self directed help session by a user with an intelligent agent enabled help module and/or live agent. A monitoring module for enabling live agent monitoring of user/customer interaction with the system. A method for providing integrated self directed, virtual agent and live agent interaction between customers and enterprises over data networks. User access over a data network to an intelligent agent enabled help module having natural language capabilities is provided. Self directed help activities and interaction between users and the help module is monitored. Activities and/or interaction requiring live agent integration are recognized. Integrating a live agent into an ongoing self directed help session by the user based on the recognition of activities and/or interaction requiring live agent interaction.

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CUSTOMER SUPPORT SYSTEMS AND METHODS PROVIDING INTEGRATED SELF DIRECTED, VIRTUAL AGENT AND LIVE AGENT INTERACTION BETWEEN CUSTOMERS AND ENTERPRISES OVER DATA NETWORKS

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Field of the Invention

The present invention is generally related to customer interaction with the Internet and customer support facilities (e.g., call centers). More particularly, the present invention is related to providing seamless integration of Internet-enabled self-service,
10   virtual agent and live agent customer service applications to provide a broad medium of interaction between customers and customer support systems over networks.

Background

The Internet provides a worldwide broadcasting and marketing capability, a
15   mechanism for information dissemination, and a medium for collaboration and interaction between individuals and companies through their computers without regard for geographic location. The Internet offers tremendous advantages for industries to increase their productivity and profitability in all areas of their business. While direct sales and marketing are important facets of using the Internet, the primary benefit for some
20   companies may be in the implementation of Internet Programs that support and facilitate sales. Several beneficial services have generally been implemented that describe a companies products and services, take orders, and accept complaints or comments via e-mail or forms.

Internet users utilize the Internet and Web-enabled sites contained therefrom to
25   find information of interest (e.g., products and services offered by a company). The Internet is basically a self-service medium where a user (e.g., customers) can interact with enterprise Web sites, serve themselves and gain an education about products and services; otherwise, they would basically pick up a telephone to contact and speak directly to a business (e.g., a call center agent).

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Today Web-based customer support is provided in many ways. "Self Help" functionality allows customers to work their way through an Enterprise's Web site via the customer's queries, whereby the customer must then choose the closest matching answer generated by an enterprise's customer support system. A customer may locate an email
5   address for customer support on the Web page and send a query through the email communication methods. Customers may also request a response via "Web call back" forms/features (i.e., by entering details on a Web form indicating a suitable time for someone to call back on the phone and the reason for the inquiry) as part of their email message. A customer may use traditional telecommunication means for calling a call
10   center customer service representative (CSR) via telephone numbers listed on a company Web page. In some circumstances a user may request to engage in live text chat from the Web site (a feature that connects users to an online CSR). Self-help applications may use a case based approach like Inference™, ServiceSoft™, Primus™, and involve some element of natural language understanding; being query based, however, prior programs
15   return more than one answer and are not generally discussion based.

With people increasingly turning to the Internet for product and service information, the quality of information provided - and service rendered generally - by organizations must improve or enterprises risk losing business to competitors. Good service can improve online customer loyalty and justify higher price points. Current
20   customer service solutions either have a very simple self-service interface (basically the Web pages that users click through/negotiate Web sites) up to more advanced interfaces involving natural language interfaces like BigScience™ and Neuromedia™. Self-service solutions, however, apparently do not effectively provide linkages to live human support, but require user selection of a GUI-based button to request human intervention (i.e., from
25   live human support to self-help operator). Current methods and system, therefore, are not apparently able to escalate "help" transactions, nor is backward escalation provided. Current systems and solutions are apparently unable to provide integrated self-help and live human help. What is apparently needed are system and methods of providing seamless integration of self service and full service call center applications for the purpose
30   of providing customer support. What are apparently also needed are methods and systems

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for providing service differentiation based on customer status within Web-enabled self service, virtual agent and live agent customer support systems.

Summary

5   Aspects of the present invention combine elements of intuitive self-service with live customer service help (e.g., from an enterprise call center), with seamless escalation between the two. The invention allows users of Web-based customer service facilities to obtain self-help using a discussion type interface using either a directed conversation approach, or undirected via natural language input.

10   The invention may integrate the self-service power of the Internet with the personality of a company's call center, enabling organizations to interact with customers through communications, such as text chat, telephone, voice-over-IP (VoIP) and e-mail. Customer support solutions as generally taught herein provide businesses with an extremely efficient, cost-effective way to manage the growing demand for Internet

15   Customer Service.

        It is one aspect of the present invention to provide a system for providing virtual agent and live agent integration to enhance customer interaction with self help, virtual agent and live agent customer support activities at an enterprise Web site available for access by customers over data communication networks. The system includes a virtual

20   agent module further comprising self directed interactive help resources available to users over a data network; a live agent module adapted to extend enterprise call center resources to a user via a live customer service agent via the network; an integration module for providing integration of customer virtual agent interaction with the live agent module base on system monitoring feedback of said customer's interaction with said

25   virtual agent or customer requests; and a monitoring module for monitoring customer interactions with the virtual agent and for providing monitoring input and integration requests to the integration module.

        It is another aspect of the present invention to provide a method for providing integrated self directed, virtual agent and live agent interaction between customers and

30   enterprises over data networks. In accordance with the method a user is provided access

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over a data network to an intelligent agent enabled help module having natural language capabilities. Self directed help activities and interaction between users and the help module are monitored. Activities and/or interaction requiring live agent integration are recognized, and a live agent is integrated into an ongoing self-directed help session by the
5   user with the help module.

The present invention is apparently the first Internet-based customer service solution to effectively blend customer self-service with virtual and human agent interaction. The present invention is a resource that may be available to customers around the clock, so the majority of service requests never reach the call center. This means that
10   costly human resources may be much more efficiently deployed.

Brief Description of the Drawings

FIGURE 1 generally illustrates an embodiment of the present invention wherein a customer is engaged in communication through network with a server that may provide
15   seamless integration between virtual and live customer support/interaction;

FIGURE 2 is an illustration of modules that may be included in/accessible by a server for providing seamless virtual and live customer support via a server in communication over a network;

FIGURE 3 is an illustration of another embodiment of the invention wherein a
20   user communicates with a discussion engine representing an enterprise;

FIGURE 4 illustrates a flow chart of steps of a method in accordance with the present invention.

FIGURE 5 illustrates a flow chart of steps of a method in accordance with the present invention.

25   FIGURE 6 illustrates a flow chart of steps of a method in accordance with the present invention.

FIGURE 7 illustrates a flow chart of steps of a method in accordance with the present invention.

FIGURE 8 is a flow chart of method steps for verifying the consistency of a
30   knowledge base by recognizing a change in a knowledge base is illustrated.

FIGURE 9 illustrates a flow chart of steps of a method in accordance with the present invention.

FIGURE 10 illustrates a flow chart of steps of a method in accordance with the present invention; and

5   FIGURE 11 illustrates a flow chart of a method of personalizing communication within the system.

Description of Preferred Embodiments

The present invention can generally integrate the self-service power of an
10   enterprise (e.g., commercial Web sites) over data networks (e.g., the Internet) with the personality of a call center, virtually and/or live, enabling organizations to interact with customers through a broad range of media.   Generally, functionality of a Discussion Engine and Knowledge Base are combined as resources with an enterprise's public data servers to provide virtual and live agent support to provide customer service solutions.
15   One aspect of the present invention utilizes a concept that may be referred to herein as "Up-front Virtual Support," which brings together virtual agent and live agent functionality. The present invention can provide customer interaction with virtual and live agents, achieving seamless integration between a company's Web site and customer support (e.g., call center) operations. For example, customers may generally request
20   support during a Web site visit to a company by clicking on a "help" button, which automatically opens an interactive dialogue box. The user can then type their queries in natural language and what may be referred to herein as a Virtual Agent will attempt to quickly respond to the user with succinct, accurate written answers. A Virtual Agent may assume various personalities, enabling it to project the image most appropriate to a
25   business.

Given the novel aspects and advantages of the present invention, routine customer inquiries can usually be solved without human intervention utilizing the Virtual Agent. When more assistance is required, another aspect of the present invention enables customers to easily escalate from self-service to personal interaction from a live agent, for
30   example a Customer Service Representative (CSR) at a call center. Customers should no

longer need to go offline (e.g., terminate a data session on the Internet) and/or utilize traditional telephony devices to call a CSR; with the present invention, customers can liaise directly with CSRs through text chat, Voice-over-IP (VoIP) and conventional telephony (assuming simultaneous voice and data sessions, such as ISDN and DSL, are available) and through any browser.

5   With another aspect of the present invention, CSRs at call centers are supported by the Knowledge Base, which also works in conjunction with the virtual agent and operates to ensure that customers utilizing online self-service are provided with consistent responses. The Knowledge Base can identify the meaning of a query. A query may be recognized via intelligent agent interaction technology (e.g., artificial agent system that interacts with users via natural language) operable in combination with a Knowledge Base (e.g., a database containing specific knowledge relating to specific applications). For example, a query may match previously programmed or recognized queries and may be matched to associated answers. A system will generally encounter similar questions from customers. For example, the top 100 questions that people typically ask a Virtual Agent may be encountered 80% of the time wherein the transactions are related. During operation, a customer may type a question into a dialogue box that can be interpreted and answered by the Virtual Agent after the question is broken down and analyzed by the Discussion Engine and Knowledge Base. If the system fails to answer after a couple of tries, it may escalate (e.g., send or connect) the customer to a live agent. The agent can then communicate with the customer via chat or voice (e.g., VoIP).

          Another aspect of the invention enables CSRs to actively monitor conversations taking place between the customer and the Virtual Agents, whereby a CSR may interrupt a virtual session when deemed necessary by the CSR. When a session is escalated to a human (live agent), automatically or by CSR intervention, another aspect of the present invention allows the Virtual Agent to continue to suggest answers, based on its own self-help knowledge base, to the CSR and/or customer, whom can either: choose to ignore the suggested answer and type it his or her own; send back the suggested answer; or edit the suggested answer before sending back to the customer.   The invention, therefore,

improves the efficiency and effectiveness of CSRs by suggesting answers for CSRs to
address customer inquiries.

Referring to **FIGURE 1**, aspects of a preferred embodiment of the invention are
illustrated. Functionality of the invention described herein is generally provided by an
5   enterprise to user/customer equipment 110 through a network 120 capable of supporting
voice and data (e.g., IP, PSTN, VoIP, ISDN, and DSL).   Enterprise networking
equipment places a user into contact with support. Enterprise networking equipment may
generally include: servers 130 for providing data and application functionality; memory
or databases 140 for storage and retrieval of data/media, access to business rules and
10   applications software; and routers/CTI (computer telephony integration) equipment 150
for directing voice and data communication to customer support representative/call center
agent equipment 160 at the Enterprise. The server 130 generally provides functionality
in accordance with the teachings of the present invention through the incorporation of a
Discussion Engine 133 and Knowledge Base 135, which together with the server 130
15   seamlessly integrate sub-service (e.g., Web surfing), virtual agent and full-service live
agent interaction (e.g., live call center agent interaction) at the Enterprise.

Functionality of a Discussion Engine 133 may be included in an Enterprise's Help
program in order to provide the full range of customer support contemplated by the
present invention. A customer interacting with a Web site may select (e.g., click on) a
20   "Help" option. A Help sub-screen generally downloads into the customer's main screen,
provided by the Web browser, and greets the customer. In accordance with the present
invention a Discussion Engine 133 is also invoked to operate in combination with a
Knowledge Base 135 to intelligently interact with the customer. Knowledge Base 135
and Discussion Engine 133 functionality may be provided through a server 130 having
25   intelligent agent enhanced/enabled database functionality. When activated by the user
(e.g., through selecting "Help" menu functionality), the Discussion Engine 133 may
initially prompt a customer, for example, "How can I help you . . ." A query field is
provided for the customer to ask a question. The Discussion Engine 133 in cooperation
with the Knowledge Base 135 analyzes a customer's questions and formulates a response.

The response may also provide the customer with hyper-linked options related to their query.

The human support component of the invention is handled by what may be referred to herein as the Live Agent Module 160, which enables CSRs to interact with customers via text chat, telephony, voice-over-IP and e-mail. A customer may also interface with the virtual agent and/or live agent via a speaker 115 (e.g., telephony or computer based microphone). Voice recognition and translation technology may allow a user to speak to the virtual agent (e.g., ask a question). The Virtual Agent Module 130 (represented mostly by the Discussion Engine and Knowledge Base) will translate the spoken speech into text and process the query. A user may also use e-mail to ask for support, or set an appointment for future support.

Referring to **FIGURE 2**, a general illustration of modules that may be included with a server 200 providing seamless virtual agent and live agent capabilities is illustrated. A customer 110 would access the server 200 via a data network 120, such as the Internet. Monitoring module 210 and Integration module 215 distinguish between live and virtual interaction and manage the flow of communication between the server 200 (and its underlying solutions) and the customer 110. A Business Rules module 220 manages rules of interaction between the Enterprise server 200 and the customer 110 by recognizing and providing control over diverse mediums (e.g., speech, text, email, chat, VoIP). The Discussion Engine 230, with support of the business rules 220 module and Knowledge Base 250, facilitates communication between the customer 110 and the Server 200. The Discussion Engine 230 and Knowledge Base 250 cooperate to recognize customer queries, and make escalation determinations based on monitoring and analysis communication difficulties. Additional data stored in databases or memory 257 may be retrieved by a profile module 259 and provided to the Discussion Engine 230 to recognize a customer (e.g., user profile and/or unique customer identification) and enhance communication where necessary (e.g., high priority customer status). Additional tools and services 240 are available via the Enterprise server (e.g., protocols, integration criteria, media support) in support of the systems, customers or live agents.

In a typical Enterprise site, a user may encounter several active buttons in related to "help" functions. At a minimum a single active button may most likely allow a user to invoke the services of the Virtual Agent. The user may also be provided for with Company contact information (e.g., 1-800 call center number, email addresses). If the customer is visiting a Web site that has Virtual Agent capabilities, the user may generally click on "help" for interaction with the Enterprise's system. The Help screen will launch within the Web page, and can be adjusted to take up a portion of the screen that is either pre-set or adjustable by the user. For example, a dialogue box (or sub-screen containing a user operable text field) would probably launch at the lower portion of the main Web-site screen shot so that the user maintain a clear view of, for example, a product specification Web page. The customer can therefore, interact with the Virtual Agent or a live agent at a call center via the dialogue box.

Referring to **FIGURE 3**, another illustration of additional system modules that may be utilized in the invention are described. For exemplary purposes only, it is assumed that a customer has selected the Help menu. A Help module 305 recognizes the Help function requests. A dialogue box 310 within a sub-screen will execute on the customer's desktop, or other user interface/devices (e.g., WAP (wireless application protocol)-enabled phone, PDA (personal digital assistants) and other devices, wired or wireless). The screen may execute on a small portion of the User's screen with a divided line between the Help box and the Web page of interest to the user. The Help box may include a query field for use by the customer for typing in queries or communicating with virtual and live agents. The Virtual Agent, represented through the Discussion Engine 320, may ask the user "What would you like to find out about?" The system may also provide some options for the user (in the form of html/linked button or text). The user selects a topic, or may ask the system a question by typing it in the query box 310. The system, via interaction between the Discussion Engine 320 and Knowledge Base 330 together acting on behalf of the Virtual Agent, interprets the question. If it doesn't understand the questions it will ask the user to ask you question again. The system may also provide some new topics based on text from user query. The system may eventually recognize the customer's question and process the query by using a Processing Engine

340. The Processing Engine 340 may refer to business rules 350 to answer the questions or provide the user with useful links (e.g., Web page pushing) that answer the query and/or provide supporting documentation. The system may also decide to escalate the user to a live agent because the answer could not be answered. If the system has voice

5 technology, the user may enter into a VoIP (voice over IP) communication with the live agent. After the query has been satisfied by the system or live agent, the user may continue with his session, backtrack to previous pages, or terminate the session. The voice technology can also be used to query the system, rather than the user having to type a query into the query box. A button in the location of the dialogue box may be used to

10 activate a speech-to-text session. A person may also call a virtual agent using telephony and interact with the virtual agent using voice recognition, and may be escalated to a CSR by requesting "help" or "operator" vocally. The virtual agent places the user into contact with a CSR and the CSR is provided with a transcript of the prior session of the customer with the virtual agent. The transcript is provided using speech to text translation. The

15 CSR may provide/push Web pages to the user during communication with the customer. This application would be most applicable to WAP-enabled wireless telephony, but may also apply to desktop PCs utilizing voice to text technology. Additional tools/modules (e.g., verification, learning, switching, voice recognition support, timing, etc.) are provided to the knowledge base 330 through modules located in the block 370, or to the

20 process engine 340 via module 380.

        An example of usefulness for the invention comes in the form of virtual agent assistance for a Bank where a user may be interested in looking up current interest rates. The user may generally find his way to a Web page where rates are posted, or the user may ask the system for the rates directly. The user asks the Virtual Agent for rate

25 information by simply typing within the provided field a query in a natural language format (e.g., "I am interested in current interest rates."). The system will return with a response query, for example "what are you interested in: credit cards, home loans, personal loans, auto . . . " The user may select "personal loans" by typing it in the field. The virtual agent will then return an answer, "personal line interest rates are at 3% today." The virtual

30 agent may also push a Web page into the user's browser for the user view with additional

personal line interest rate information, or provide hyperlinks. For example, the agent may
point the user to a Web site where actual up to date information related to the questions
may exist. The virtual agent may also guide a user through a limited transaction, e.g.,
filling out a loan application. If the user is unsure about a transaction, he may actually
5   need to speak to someone, either through chat means or voice communication. The
system can automatically escalates the user to a live agent at the user's request, or when
the system recognizes user difficulty. Escalation automatically transfers the user, for
instance, if the system is unable to answer a customer's last question (e.g., if the same
question/answers are provided more than twice). Escalation may occur sooner or later
10   depending on the customer's status with the system. The customer will be escalated by
being transferred to a CSR within a call center. The entire transcript of the customer's
interaction with the company Web site and Virtual Agent also gets transferred to the CSR
for reference.   The person at the call center may answer the customer and/or push
relevant Web pages down to the customer that may guide them to a solution or answer
15   (e.g., "check out this site . . ."). The CSR may also make a call to the person if the user
has a voice over IP or integrated data/voice connection. In the alternative, the CSR may
tell the customer via text communication "I'll call you on your home phone number," or
"call me directly at _____." The live textual interaction enables continued
communication up until termination by the customer. When a live CSR session has been
20   terminated, the customer may then get a message from the system (Virtual Agent) in their
dialog box that says, for example, "Your customer service representative has left the
session, however, I'm still here to help you if you need me later."

       Once the Virtual Agent has been launched by the customer, the customer may
continue to transact business on the main Enterprise screen while the Virtual Agent acts
25   as a companion by pushing additional information or links into the sub-screen area that
are related to the customers current interaction at the Web site. The Virtual agent may
be turned off by the customer by closing the sub-screen (and dialogue box) or upon
leaving an Enterprise's Web site.

       Not confined to text-based responses, it is another inventive aspect to allow a
30   virtual agent to "push" Web pages and even stream multimedia demonstrations directly

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to customers, greatly enhancing their online experience. For example, when a user is in the middle of a conversation with the virtual agent and it's picking up that the user, through discussion, is becoming interested in a certain area and maybe there's like a little foot note section where it starts popping in relevant URL's that it has in its database.

5   Generally, every question asked of the virtual agent has the potential of being answered with a push of a Web page URL's. The ability to push a URL into the main page relating to that context and push an additional URL, which may be an advertising or marketing URL. Could be like on a tangent kind of information.

Referring again to **FIGURE 3**, it is an aspect of the present invention provides
10   service differentiation based on customer status or given the context of a conversation. Based on business rules, a customer's integration with the Enterprise's customer support system may be based on unique customer identification (e.g., user profile) or the content of a user's query or communication. A Personalization Engine 360 may determine a customer's status (e.g., Gold, Platinum, etc.), which can be a rating based on historical
15   information (e.g., historical transactions), which may also be stored in and accessed from the knowledge base 350 or some other memory accessible from the system. Data regarding a customer may be used for a basis of rendering a service rating or quality of service. The system may be set up to react, based on input from the Personalization Engine 360, by implementing business rules 350 for carrying out further
20   transactions/communication with the customer based on the customer's status/rank. For example, a customer may be identified with an importance indicator (e.g., very high priority cue) that requires live CSR monitoring. The CSR or the system may then generate a personalized greeting and/or provide enhanced features (e.g., CSR monitoring/attendance).

25   Referring to **FIGURE 4**, basic steps that may be executed by a system programmed to carry out the present aspect of the invention are illustrated. The system would be programmed for determining a customer's status 410, determining service differentiation criteria 420 based on said customers status to said system, and providing service to the customer 430 commensurate with the service differentiation criteria.

Another aspect of the present invention provides for confidence level grading of
communications. Communications include the exchange of data over networks related
to chat, email, voice-recognition and other multimedia. Communications may be by a
customer directly with an enterprise site. Communication may be self service (e.g.,
5   Virtual Agent) and live with a customer service representative (e.g., Live Agent).
Query/communication scoring is used to assist the system in the routing communication
based on a customer's interaction experience.

Referring to **FIGURE 5**, the system may receive 510 a customer communication
(e.g., email) before it goes to a CSR and applies business rules 520, which may be
10   managed by a Knowledge Base, to the communication. The Knowledge Base analyzes
530 the message (break the email down into segments where necessary, and may even
suggest answers or related categories) to determine a confidence level, score and/or grade
for said communication. The system provides a grade 540 for said communication, which
is used for further action 550 by the system regarding the communication (e.g., routing
15   communication to customer support resources associated with said customer support
facilities based on said grade).

Where a CSR is involved (instead of or in addition to a Virtual Agent) the Virtual
Agent module may assist the CSR by previewing a communication, identifying
issues/categories, and forwarding the communication for CSR review. For example, if the
20   system receives an email "Hi my name is Mario I inquired about a home loan with you
guys. I'm just wandering what fees apply to the home loan and how do I increase my
credit score." The system will process the email and create a confidence level predicting
the subject area the email message is to. The message can be forwarded to the mortgage
department of a financial institution. Confidence level scoring applied in this manner may
25   also assist in live chat applications. The system would rank the context of the text prior
to rendering an escalation determination. For example, the system may also rank the
communication in order to match CSR profiles and capabilities to process the
communication or issues raised by the communication. This may ensure a call center
agent with the right skill-set is summoned into action. If for example, an email or chat
30   message contains three questions, each question would be evaluated and a confidence

score for the entire communication would be used to determine how to escalate the
message.

Referring again to **FIGURE 3**, an aspect of the invention provides for context
switching methods generally operational within the Discussion Engine 320. The
5   discussion engine 320 automates virtual communication by the system with users with
assistance from the knowledge base 320 and may operate to recognize context changes.
A knowledge base 330 may be employed to interpret communications received from users
in the system and a context switching module 370 associated with the discussion engine
for providing context switching wherein a allows the out system to maintain the overall
10   context of an ongoing communication.

Context switching may be referred to also as "I meant" context switching because
it allows the customer service system to maintain the overall context of an ongoing
communication. The "I meant" context switching function allows the self-help to switch
the context and remember the element of the discussion that was referred too, and apply
15   that in the newly switched context. The system automatically adjusts to a change within
the context ongoing communications between remote users and virtual agent-adapted
customer support systems accessible over data networks. Referring to **FIGURE 6**, for
example. The system receives 610 subsequent communication from a user already
engaged in ongoing communication with a virtual agent. The system analyzes 620 the
20   subsequent communication, recognizes 630 a change in context of the subsequent
communication from prior communications with the user, develops response 640 to the
subsequent communication, and replies 650 to the subsequent communication in
accordance with said change in context. For example:

User types-> tell me about my home loan interest rates.

25   Self -Help Responds -> they are 7.0 % p.a.

User types-> Sorry I meant f or my savings account (or, "how about for my
savings account", etc.).

Self-Help Responds->the interest rates for your savings account is 4.2% p.a.

(The context has switched to Savings Account from Home Loan but the self-help
30   remembers what the user was asking about).

The "I Meant" module allows the Virtual Agent to recognize and maintain a commonality of the subject matter where the customer is interested in and discussing "interest rates" between two different, although related products (e.g., loans). The "I Meant" action is a feature as part of the Discussion Engine general algorithm. This checks

5   if the user question entered is the same as the previous one. If it is the same, it can skip a large amount of processing and simply picks and return an unused answer from the previous question pattern's answer set.

Context switching may be maintained as a feature of the Discussion Engine. The context switching feature checks if the user's question entered into the system falls within

10 the same or closely related field as previous questions. If it is the same, the virtual agent can skip a large amount of processing and simply picks and return an unused answer from the previous question pattern's answer set.

Example: *Special Case One*

User input: I want personal loan

15 Agent output: some answer for personal loan information

User input: tell me about fees

Agent output: displays a list of subjects for selection (e.g. subject areas A and B)

User input: I meant for C is another subject area)

[reconstructed question will be "fees for C"]

20 Agent output: The fees for C is . . . . . .

When the agent outputs a list of subjects for selection, it is placed in a special mode. If this case is not handled the reconstructed question will become "personal loan for C" but not "fees for C". To handle this case properly we have to reconstruct the question using currently stored simplified question words (in this case is "fees").

25

Special Case Two

Assume the current subject area is "Home Loan".

User input: Tell me about the current interest rate.

Agent output: The current interest rate for home loan is 0.1% P/A.

30 User input: I meant to ask for terms for home loan.

[reconstructed question will be "ask for terms for home loan"]

    Agent output: The terms for home loan are...

    This scenario happens when the question is classified as an "I Meant" question but what really happens is the user wants the agent to provide another piece of information that falls under the same subject area. A sufficient condition for detecting this special case is to make sure the input doesn't contain any keywords in any subject area.

Special Case Three

User input:	Tell me some features for home loan
Agent output:	Some features of home loan (followed by secondary selection list)
Agent output:	Please pick an item from the list below:
Agent output:	1. Interest rate
Agent output:	2. Fees
User input:	1
Agent output:	The current interest rate is 0.1% p/a.
User input:	I meant for saving account.

[reconstructed question will be "1 interest rate for saving account"]

    Agent output: The interest rate for saving account is 10% P/A.

    The special case occurs when the user put "I meant for saving account". I should be noted that in the example the last user response is "I". The agent will have to use the keywords associated with the selected entry to reconstruct an "I Meant" question if the user asks for one.

    Another aspect of the invention enables the system to dynamically control the release of information contained within the Knowledge Base based on the status of or interaction with a customer. Release of information contained in a self-service Knowledge Base may be activated by profile of customer, money spent on-line, time stamp, date stamp, etc. The Knowledge Base may be partitioned, for example, in order to filter critical information from being released to a casual visitor. A registered customer,

however, may receive full functionality and information from the Knowledge Base and
Virtual Agent.

This aspect of the invention allows for dynamically changing knowledge base
content (therefore, dynamic self-help) and business rules based on criteria's such as
5   customer profile, money spent online, time and date and the ability to define other
measures through a programmers interface. This allows the self-help interface to behave
differently depending on the above variables or newly defined ones via a programmer's
interface without human intervention. Eq. a certain special will be available

Rules can be inserted into the Knowledge Base to allow for activation of
10   knowledge base content which can then be made available transparently to a user (group
or individual) based on the users profile, money spent online, time and date and any other
definable via a programmers interface.

Referring to **FIGURE** 7 wherein is illustrated a flow chart of steps of a method
in accordance with the present invention, a system first receives 710 communication from
15   a user. The system identifies the user 720. A profile associated with the user is retrieved
730. The user's authorization level for access to information from the system is
determined 740 based on the profile. Finally, some information may be released 750 to
the user based on the profile. A customer service representative may be able to override
a determination by the system.

20   Another aspect of the present invention provides for a Knowledge Consistency
module, which may allow the consistency of a knowledge base to be verified. When a
change in knowledge bases is made it becomes very difficult to determine what effects it
may or may not have on other aspects of the knowledge base. This aspect of the invention
allow a user to determine the consistency of the knowledge base by processing a pre-
25   determined set of questions against itself and determining which ones are correctly
responding with the expectant answer.

Referring again to **FIGURE 3**, a system for providing knowledge
consistency/verification of knowledge bases within systems for providing integrated self
directed, virtual agent and live agent interaction between customers and enterprises over
30   data networks is shown. Verification of knowledge base consistency may be managed by

a verification tool 370 operating within said system as a means for accessing a dictionary and verifying question patterns received by the knowledge base 330. A learning module, co-located with the verification tool in tool module 370 may operate in cooperation with the verification tool and knowledge consistency module 330 to update knowledge

5   consistency module information. The verification tool and learning module may together be referred to as a knowledge consistency module.

Referring to **FIGURE 8**, a method for verifying the consistency of a knowledge base by recognizing a change in a knowledge base is illustrated. During verification a pre-determined set of questions are provided 810 by a consistency module for processing by

10   the knowledge base. The consistency module determines accuracy 820 of responses by the knowledge base to the questions. A learning mode may be invoked during verification for automatically upgrading a knowledge base based on ongoing customer interaction with customer service applications.

A KB Verification Tool (Test Tool) can be used to test the entire knowledge base

15   and identify questions that are causing erroneous responses. A Test Tool can be opened using the toolbar (TT) or the **Tools** menu. The Test Tool allows you to check both the dictionary and the question patterns (including attributes that have been used) in the knowledge base.

-       Clicking the **Start** button will begin the testing and you can stop at any

20   time by clicking **Stop.**

-       If the **Check dictionary** check box has been ticked, the tool will check that all words included in word groups are present in the dictionary.

-       If the **Fix Dictionary** check box is also ticked, the tool will repair any errors of that kind.

25   -   The entire dictionary can be discarded and rebuilt by ticking the **Rebuild Dictionary** check box.

-       If the **Check Question Patterns** check box has been ticked, the tool will run each of the test questions through the agent and compare the expected response with the actual response. Where there is a discrepancy between the two, an error message will

30   be displayed

- By ticking the **Show Selection Warnings** check box, you can also see the questions that result in the user being prompted to choose a subject area from which the answer should be given.

5   When the tool has completed the testing, the number of questions processed and the number of errors identified will be displayed at the top of the window.

A learning mode could be integrated into the system to automatically upgrade the Knowledge Base based on customer interaction (e.g., questions and responses). Changes are automatically made to the system when, for example, it seems certain questions are

10   actually going to different areas of the knowledge button that wasn't going through that have been predefined by the user. It might actually be telling the user to hang on a second.

Another aspect of the invention provides for Hyper-linked email sent to a user containing relevant points of interest based a query, or directly to live human

15   representative together with the context of the session. In generating auto-response to email it is sometimes necessary to obtain further information in order to solve a customers problem. This invention allows a user who sends a request via email, fax, voice recognition etc. to obtain a response a automatic machine generated response via email which contains a automatic generated URL that allows them to then initiate a self-help

20   session which starts the user off from a specified point in the knowledge bases using the already known information from the first session or the URL automatically creates a session to a specified live human who automatically obtains all relevant historical data. This aspect of the invention allows users to better help themselves by helping them understand what is required and giving them an opportunity to let them find out by

25   pointing them to the relevant areas of the knowledge base f or there particular query. Also, if users need help from live human representative they are given a direct link which automatically escalates the customer to a live human representative who is able to see what has been occurring (e.g., provided a script of prior communication by the user with the virtual agent) and may help the user without the need to ask any initial questions that

30   may be already known.

-20-

Referring to **FIGURE 9**, wherein is illustrated a flow chart of method steps in accordance with an aspect of the present invention, a communication is received by a system 910 from a user. A virtual agent identifies 920 relevant points of interest or queries contained within the communication. The virtual agent matches 930 the

5   communication with information accessible by a customer support system. The virtual agent provides 940 a hyper-linked communication to the user, the hyper-linked communication enabling users to obtain help and/or additional information related to said communication received from the user. A system for providing hyper-linked communication to users includes a virtual agent where, as shown in **FIGURE 3**, a

10 discussion engine 320 for assessing a communication received by a user and a knowledge base 330 in support of the discussion engine 320 for determining the nature of the communication, wherein said virtual agent and knowledge base respond to the communication received by the user with a communication having a hyperlink for automatically referring users to relevant points of interest in support of the communication

15 and/or to a live agent.

When a user sends an email to the enterprise through and the virtual agent, the virtual agent can have the first opportunity to respond to the email. The Virtual Agent assesses the email with the assistance of the Knowledge Base and determines what is being requested. The Virtual agent may formulate a response that is provided back to the user,

20 or the email may be forwarded to an appropriate live agent. A live agent may be selected based on a match of the live agent's capabilities and the general field of the query. The Knowledge Base may provide the agent a hyperlink to supporting information.

An aspect of the present invention provides for time based responses may be provided by the system to the user if customer service representative does not respond to

25 automatically generated response within a certain amount of time. The Virtual Agent can intervene and formulate a response to a customer support representative when a representative is slow in responding to a customers query during a live agent session. The Virtual Agent may provide a response directly toe the customer support representative and/or to the customer. The virtual agent response may be provided as guidance to the

30 customer support representative. If the response is not seen by the customer, the live

agent may select the virtual agent's response as the live agent's response. If the live agent is non-responsive for a long period of time, the virtual agent response may be provided on behalf of the live agent. A virtual agent response would most likely be provided if greater than 10 seconds have elapsed without a live agent response. This time period is adjustable.

Referring to **FIGURE 10**, illustrated is a flow chart of steps for a method in accordance with the present invention. Communication between a customer and live agent is monitored 1010. Non-responsiveness by a live agent is identified 1020. A virtual agent may develop a response 1030 to a customer on behalf of the live agent. The virtual agent may provide the response in accordance with business rules 1040, wherein business rules may be used to determine if a live agent is nonresponsive. The virtual agent may first provide the response to the live agent 1050 for approval and/or adoption, and then the virtual agent may provide the response directly to the customer 1060 if the live agent is also nonresponsive to the virtual agent.

Referring again to **FIGURE 3**, a time based response module 380 operates in support of the process engine 340 and may enable the provision of a response to a user based on a predefined time period elapsing since a previous system response. A discussion engine 320 and knowledge base 330 may be used for developing a virtual agent response and communicating the virtual agent response to a live agent and/or customer.

Referring to **FIGURE 11**, an aspect of the invention allows for very specific personalized responses to be automatically generated via discussion based self-service session. A user is able to ask questions via a device (questions may be asked using voice, gestures, text or any other form of input). After the system receives user communication 1110, the customer may be identified 1120. Concurrent with, or after, customer identification, the virtual agent analyzes 1130 the communication, formulates a generic response 1140 to the communication, and personalizes the generic response 1150 using known user information about the customer before responsive context of said generic answer is sent to the customer.

The system generally includes means for receiving communication (as described in **FIGURE 1**) from a customer at a customer service operation over a data network, a virtual agent, generally represented by the discussion engine 320 and knowledge base 330 shown in **FIGURE 3**, for analyzing the communication and formulating a generic

5   response to the communication, and a personalization engine 360, for personalizing the generic response using known user information about the customer before responsive context of said generic answer is sent to the customer. The discussion engine 320 processes this request together with the process engine. The generic response is generated from this engine by translating the request (which can also be in a natural

10   language format) as a query into a knowledge base (or database of some sort). The personalization engine 360 is invoked before the generic answer is sent to deduce if a personalized response is possible.

Discussion based personalization of contact and answers is generally based on business rules 350 and personal database (may be represented in the knowledge base 330

15   or with the database containing business rules 350). During operation, a Java applet (or HTML/XML) client may be downloaded (which we will refer to from herein as the ClientApp), which establishes a connection to the discussion engine over the Internet. The ClientApp determines the browser of the user and other aspects such as the best and preferred communication protocol to use. The ClientApp also checks to see if there is a

20   personalization file created (e.g., similar to a cookie, but not restricted to storage on the client side) for this customer as they may have already logged on before; in this scenario Bob (the customer) is requesting customer service for the first time from the Internet. The following scenario exemplifies personalization:

Number 1: First Time User Logon

Number 2: Authenticated User Logon with Personalization

Number 1: Bob enters ACME's bank site for the first time, and clicks on the customer

5   support button, new window is created as a frame and the following text is displayed:

Virtual Agent: Hi, welcome ACME's customer support, this seems to be the first time
you have come by; or you are accessing customer support from a different computer, have
you registered before?

10   1.   Yes

2.   No

Guest: No

15   **Side Note:**

The user is able to select by entering words (like "No" or "Yes" etc.), entering the number
item like "2" for No, or by clicking on the selection with a mouse (like a hyperlink)

Virtual Agent: Would you like to register? (this will mean that we will be able to better

20   serve you in the future; you only ever need to register once)

1.   Yes

2.   No

Guest: Yes

25

Virtual Agent: What is your name First (or Christian name)?

Guest: Bob

30   **Automated Agent:** Hi Bob, what is your surname?

Bob: My surname is Hampter

Automated Agent: Would you rather that I call you:

1.   Bob

5   2.   Mr. Hampter

3.   Some other name

Bob: Some other name please

10   **Virtual Agent:** Sure, how would you like to be called?

Bob: BH

Virtual Agent: Great, RH it is, I need a few more details so I can provide you with more
personalized service, *what is you email address?* (we will not give this to anyone else)

15

BH: my email address is <u>bob@yahoo.com</u>

Virtual Agent: Right, <u>bob@yahoo.com,</u> do you have an account with us?

20   **BH:** Yep, I have a savings account

Etc....

A profile may be created by storing the system that stores Bob's personal
information and/or transactional details allowing him to have a unique user id and
25   password that gets verified by the back-end systems. Once verification is completed the
personalization engine is able to process each query with a particular personalized
response for the online customer. If the personalization engine is not installed or if the
customer is not identified, the customer still obtains a response but it is not personalized.
In further example, Bob enters ACME's bank site and the system finds a profile with Bob's
30   preferences such as, his name etc. In this example Bob is after the current interest rates

on his home loan and would like to know his total interest paid for lost financial year on his home loan his savings account. The transaction is as follows:

Virtual Agent: Hi, BH welcome back, I need you to enter your user id (for security
5   reasons)

BH: BOBS ACCOUNT

Virtual Agent: Now please enter your password

10
BH: BOBS PASSWORD

Virtual Agent: You have been authenticated, how can I help you today BH, would you like to....
15   *1. Check your Savings Account balance?*
2. Check your Home Loan Account balance?
3. Look at our new term deposit rates?
4. Find out about our latest promotions and special deals?
5. Something else....

20
BH: I would like to know the current interest rates

Authentication is done through an encrypted secure connection. Note that the italic response denotes a personalized response based on the question asked; when a
25   question is not asked (for instance in this example when Bob has authenticated, the personalization engine responds based on previous history sessions and make a best guess in terms of what Bob would most likely want to do; if Bob selected "Support" from a particular Web page (say he was looking at the fees page for home loans) the personalization engine would prompt Bob with the personalized message "...Would you
30   like to know the fees for your home loan BH ?". If the personalization engine were not

installed or deactivated the discussion engine would respond with "Would you like to know the fees for a Home Loan?", although this is a trivial example it gives an idea of how the personalization engine operates.

5   **Virtual Agent:** For your....
     1. Savings account
     2. Home Loan account
     3. Visa Account
     4. Other Accounts

10   **BH:** my loan account

     Virtual Agent: The current interest rates for your home loan is 5.6% p.a. calculated daily

15   **BH:** what has been the total interest paid

     Virtual Agent: For which period....
     1. ..this financial year 1 July 1999 to 30 Jun2OOO
     2. ..last financial year 1 July 1998 to 30 June 1999
20   3. Or some other period of time

     BH: last financial year

     Virtual Agent: The total interest paid on your loan account between 1 July 1998 to
25   3OJune1999 was $356.45

     BH: how about for my savings account

     Virtual Agent: The total interest paid on your savings account between 1 July 1998 to
30   3OJune1999 was $86.90

In the example personalization makes use of the appropriate business rules to extract the appropriate data from the customer database and perform the necessary calculation for the request. Also special context switching feature part of the discussion engine, which allows the user to switch to a different Subject Area while still maintaining the context of "wanting to calculate the total interest for last financial year" as demonstrated in this scenario. It should be noted that the same could be done without the personalization engine; i.e. A user is still able to get information about their account however, the responses will not be personalized.

A user interface may be in the form of a number of devices including, text chat, WAP (Wireless Application Protocol), Telephone or Mobile Phone via a voice recognition interface or email for both self-help and live interaction. The invention may allow systems to grade support based on the type of media interaction (e.g., Voice, text chat, WAP) and support mechanism (e.g., "self-help" via Virtual Agent to Live Human Support).

End-users require no special software to interact with the present invention. They simply type their queries, in natural language, directly into their browsers. If interaction with a human is required, customers can escalate their enquiry to text chat or voice communication with a simple click of a button.

The present invention may be implemented on a Windows NT-based architecture, is secure and scalable, and integrates seamlessly with all existing Web sites. Up-front Support is connectable with existing Enterprise infrastructure, such as PBX, CTI and CRM systems.

The present invention provides businesses with a single view of all online interactions with their customers, whether Web, e-mail or voice. The ability to capture and reuse customer knowledge allows companies to monitor trends, build customer profiles, and provide "tiered" customer support.

Advantages of the present invention for customers include: on-line service without having to shut down their system if they only have access to a single phone line; empowers customers to help themselves, thus providing 24 hour, 7 day service for routine queries; can be accessed with any browser (no plug-ins required); allows customers to submit

queries in plain English (no complex navigational structures to learn); and enables
customers to easily escalate their inquiry from automated self-help to interaction with a
human agent. Advantages for an enterprise include: a shift of the burden of handling
routine queries from CSRs to the Virtual Agent (CSRs therefore have more time to
5   manage complex inquiries and provide premium service to high-value customers);
integration with all existing Web sites; integration with call management and customer
relationship systems to provide a single view of all on-line interactions, including Web,
e-mail and voice; the system can capture and reuse customer knowledge, allowing
organizations to monitor trends and provide tiered customer support; and the architecture
10   is fast, secure and scalable.

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WHAT IS CLAIMED IS:

1.   A system for providing virtual agent and live agent integration to enhance customer interaction with self help, virtual agent and live agent customer support activities
5   at an enterprise Web site available for access by customers over communication networks, comprising:

        a virtual agent module further comprising self directed interactive help resources available to users over a data network;

        a live agent module adapted to extend enterprise call center resources to a user via
10   a live customer service agent via said network;

        an integration module for providing integration of customer virtual agent interaction with said live agent module base on system monitoring feedback of the customer's interaction with said virtual agent or customer requests; and

        a monitoring module for monitoring customer interactions with said virtual agent
15   and for providing monitoring input and integration requests to said integration module.

2.   The system of claim 1 wherein said monitoring module may request said integration module to escalate a user session to said live agent based on customer interactions with said enterprise self help resources.
20

3.   The system of claim 2 wherein said live agent is providing input from said monitoring module, enabling said live agent to monitor virtual agent interaction with system users.

25   4.   The system of claim 1 wherein said virtual agent further comprises a intelligent agent enhanced for providing natural language capabilities.

5.   The system of claim 2 further comprising a user profile module for recognizing system users and providing service profile information accessible by said virtual agent and
30   said live agent.

6.   The system of claim 1 said virtual agent module further comprising a Knowledge Base for use in a an integrated virtual agent live agent environment, said knowledge base further comprising:

        communication with a discussion engine for receiving queries from and submitting queries to a user;

        network access for retrieving information available on a network; and

        access to a intelligent agent for analyzing queries received from said discussion engine and formulating a response utilizing access to information at said intelligent agent enhanced database and/or information resources available on the network.

7.   A system for providing integrated virtual agent and live agent interaction between enterprise users and an enterprise over data networks, comprising:

        a virtual agent module having natural language capabilities and available for self directed help information to users over a data network;

        a live agent module adapted to extend enterprise call center resources via a live customer service agent to users over said data network;

        an integration module for providing selective integration of a self directed help session by a user with said intelligent agent enabled help module and live agent; and

        a monitoring module for enabling live agent monitoring of user customer interaction with the system.

8.   The system of claim 7 wherein live interaction with the user is provided simultaneously with the user's self directed interaction with the intelligent agent enabled help module;

9.   The system of claim 7 wherein selective integration by said integration module may be based on a customer's interaction with said intelligent agent enabled help module.

10. The system of claim 7 wherein selective integration by said integration module may be based on intervention requested by said a live agent.

11. The system of claim 7, wherein said integration module monitors user interaction for purposes of selective integration using input from said monitoring module.

12. The system of claim 7 further comprising a user profile module for recognizing system users and retrieving a user profile for use by the system in rendering service to the user by said virtual agent and said live agent.

13. The system of claim 1 said virtual agent module further comprising a Knowledge Base for use in a an integrated virtual agent live agent environment, said knowledge base further comprising:

communication with a discussion engine for receiving queries from and submitting queries to a user;

network access for retrieving information available on a network; and

access to a intelligent agent for analyzing queries received from said discussion engine and formulating a response utilizing access to information at said intelligent agent enhanced database and/or information resources available on the network.

14. A method for providing integrated self directed, virtual agent and live agent interaction between customers and enterprises over data networks, comprising:

providing user access over a data network to an intelligent agent enabled help module having natural language capabilities;

monitoring self directed help activities and interaction between users and the help module;

recognizing activities and/or interaction requiring live agent integration; and

integrating a live agent into an ongoing self directed help session by the user with said help module.

15.   The method of claim 14 wherein activities and/or interaction requiring agent integration is a user's request for live agent intervention.

16.   The method of claim 14 wherein activities and/or interaction requiring agent integration is a live agent's request for intervention.

17.   The method of claim 14 wherein activities and/or interaction requiring agent integration is at least one redundant question by a user.

18.   The method of claim 14 wherein activities and/or interaction requiring agent integration is at least one redundant response by said intelligent agent enabled help module.

FIG. 1

FIG. 2

SERVER 200

215 INTEGRATION

MONITORING 210

BUSINESS RULES 220

Virtual Speech/Text
- Email
- Chat

Live Speech/Text
- Email
- Chat
- VoIP

DISCUSSION ENGINE 230

Self Service   Customer Support

KNOWLEDGE BASE 250

259

257

TOOLS & SERVICES 240

(Protocols, system integration, media, software, etc.)

120

110

FIG. 3

FIG. 4

```
DETERMINE CUSTOMER          410
      STATUS

         │
         ▼

 DETERMINE SERVICE           420
  DIFFERENTIATION
     CRITERIA

         │
         ▼

PROVIDE SERVICES TO          430
     CUSTOMER
COMMENSURATE WITH
     CRITERIA
```

FIG. 5

```
┌──────────────────────────┐
│  RECEIVE COMMUNICATION    │──── 510
│     FROM CUSTOMER         │
└──────────────────────────┘
              │
              ▼
┌──────────────────────────┐
│  APPLY BUSINESS RULES TO  │──── 520
│     COMMUNICATION         │
└──────────────────────────┘
              │
              ▼
┌──────────────────────────┐
│   KNOWLEDGE BASE          │──── 530
│   ANALYZES MESSAGE        │
└──────────────────────────┘
              │
              ▼
┌──────────────────────────┐
│     GRADE FOR             │──── 540
│  COMMUNICATION IS         │
│     PROVIDED              │
└──────────────────────────┘
              │
              ▼
┌──────────────────────────┐
│ ACTION IS CARRIED OUT ON  │──── 550
│  COMMUNICATION BASED      │
│     ON GRADE              │
└──────────────────────────┘
```

FIG. 6

```
┌─────────────────────┐
│  RECEIVE SUBSEQUENT │        610
│ COMMUNICATION FROM  │
│        USER         │
└─────────────────────┘
            │
            ▼
┌─────────────────────┐
│  ANALYZE SUBSEQUENT │        620
│    COMMUNICATION    │
└─────────────────────┘
            │
            ▼
┌─────────────────────┐
│ CHANGE IN CONTEXT OF│        630
│  COMMUNICATION IS   │
│     RECOGNIZED      │
└─────────────────────┘
            │
            ▼
┌─────────────────────┐
│ REPLY TO SUBSEQUENT │        640
│  COMMUNICATION IS   │
│     DEVELOPED       │
└─────────────────────┘
            │
            ▼
┌─────────────────────┐
│ REPLY TO SUBSEQUENT │        650
│  COMMUNICATION IS   │
│  PROVIDED TO USER   │
└─────────────────────┘
```

FIG. 7

```
┌─────────────────────┐
│   COMMUNICATION     │ ─── 710
│  RECEIVED FROM USER │
└─────────────────────┘
          │
          ▼
┌─────────────────────┐
│   USER IS IDENTIFIED │ ─── 720
└─────────────────────┘
          │
          ▼
┌─────────────────────┐
│ PROFILE ASSOCIATED WITH │ ─── 730
│   USER IS RETRIEVED  │
└─────────────────────┘
          │
          ▼
┌─────────────────────┐
│  USER AUTHORIZATION  │ ─── 740
│  LEVEL IS DETERMINED │
└─────────────────────┘
          │
          ▼
┌─────────────────────┐
│ INFORMATION IS RELEASED │ ─── 750
│   TO USER BASED ON USER │
│   AUTHORIZATION LEVEL   │
└─────────────────────┘
```

FIG. 8

```
┌─────────────────────────┐
│    PREDETERMINED        │           810
│ QUESTIONS ARE PROVIDED  │
│ TO THE KNOWLEDGE BASE   │
│                         │
└─────────────────────────┘
            │
            ▼
┌─────────────────────────┐           820
│ DETERMINE ACCURACY OF   │
│ RESPONSES BY KNOWLEDGE  │
│         BASE            │
└─────────────────────────┘
```

FIG. 9

```
   ┌─────────────────────┐
   │    COMMUNICATION    │ ── 910
   │  RECEIVED FROM USER │
   └─────────────────────┘
              │
              ▼
   ┌─────────────────────┐
   │    VIRTUAL AGENT    │ ── 920
   │ IDENTIFIES RELEVANT │
   │  POINTS OF INTEREST │
   └─────────────────────┘
              │
              ▼
   ┌─────────────────────┐
   │ VIRTUAL AGENT MATCHES│ ── 930
   │  COMMUNICATION WITH │
   │  SYSTEM INFORMATION │
   └─────────────────────┘
              │
              ▼
   ┌─────────────────────┐
   │ VIRTUAL AGENT PROVIDES│ ── 940
   │ HYPER-LINK ASSOCIATED│
   │  WITH INFORMATION TO │
   │         USER         │
   └─────────────────────┘
```

FIG. 10

```
                    ┌──────────────────────────┐       1010
                    │   LIVE AGENT-CUSTOMER    │──────
                    │     COMMUNICATION        │
                    │       MONITORED          │
                    └──────────────────────────┘
                                 │
                                 ▼
                    ┌──────────────────────────┐       1020
                    │      LIVE AGENT          │──────
                    │   RESPONSIVENESS         │
                    │     IDENTIFIED           │
                    └──────────────────────────┘
                                 │
                                 ▼
                    ┌──────────────────────────┐       1030
                    │  RESPONSE DEVELOPED BY   │──────
                    │     VIRTUAL AGENT        │
                    └──────────────────────────┘
                                 │
                                 ▼
        1050                ┌──────────────────────────┐   1040
         │                 │ VIRTUAL AGENT DELIVERS   │──────
┌──────────────────────┐   │ RESPONSE IN ACCORDANCE   │
│ RESPONSE DELIVERED TO │◄──│   WITH BUSINESS RULES    │
│     LIVE AGENT        │   └──────────────────────────┘
└──────────────────────┘          ┊
         │                         ┊ 1060
         ▼                         ┊
┌──────────────────────┐           ┊
│ RESPONSE DELIVERED TO │◄┄┄┄┄┄┄┄┄┄┘
│     CUSTOMER          │
└──────────────────────┘
```

FIG. 11

```
┌─────────────────────────┐
│  USER COMMUNICATION     │ ─── 1110
│  RECEIVED BY SYSTEM     │
└─────────────────────────┘
             │
             ▼
┌─────────────────────────┐
│   CUSTOMER IDENTIFIED   │ ─── 1120
└─────────────────────────┘
             │
             ▼
┌─────────────────────────┐
│ VIRTUAL AGENT ANALYZES  │ ─── 1130
│     COMMUNICATION       │
└─────────────────────────┘
             │
             ▼
┌─────────────────────────┐
│     VIRTUAL AGENT       │ ─── 1140
│  FORMULATES GENERIC     │
│       RESPONSE          │
└─────────────────────────┘
             │
             ▼
┌─────────────────────────┐
│  GENERIC RESPONSE IS    │ ─── 1150
│  PERSONALIZED USING     │
│ INFORMATION ABOUT USER  │
└─────────────────────────┘
```